

What is claimed is:

1. A gas separation apparatus, comprising:
 - a cyclone or hydroclone having a gas outlet and a discharge outlet;
 - a containment vessel in communication with the gas outlet and in communication with the discharge outlet; and

5 a purge gas stream in communication with the discharge outlet and in communication with the containment vessel.

 2. The apparatus of Claim 1, wherein the gas separation chamber is a cyclone adapted for the separation of gas from a gas/solid mixture.

10 3. The apparatus of Claim 1, wherein the gas separation chamber is a hydrocyclone adapted for the separation of gas from a gas/liquid mixture.

 4. The apparatus of Claim 1, wherein the containment vessel is pressurized.
 5. A method for separating gas from a first gas/solid or gas/liquid mixture, comprising the steps of:
 - 15 introducing the first gas/solid or gas/liquid mixture into a cyclone or hydroclone, respectively;
 - separating the first mixture into a gas overflow and a discharge underflow;
 - introducing a purge gas stream to the discharge underflow to create a second mixture comprising purge gas and gas displaced from the discharge underflow; and

20 merging the second mixture with the gas overflow.

 6. The method of Claim 5, wherein the first mixture is a gas/solid mixture.
 7. The method of Claim 5, wherein the gas is chlorine and the solid is titanium dioxide.
 8. The method of Claim 5, wherein the first mixture is a gas/liquid mixture.

25 9. The method of Claim 6, wherein the discharge underflow comprises a majority portion of solids and a minority portion of gas.

 10. The method of Claim 7, wherein the discharge underflow comprises a majority portion of liquid and a minority portion of gas.

11. The method of Claim 5, wherein the purge gas is nitrogen or carbon dioxide.